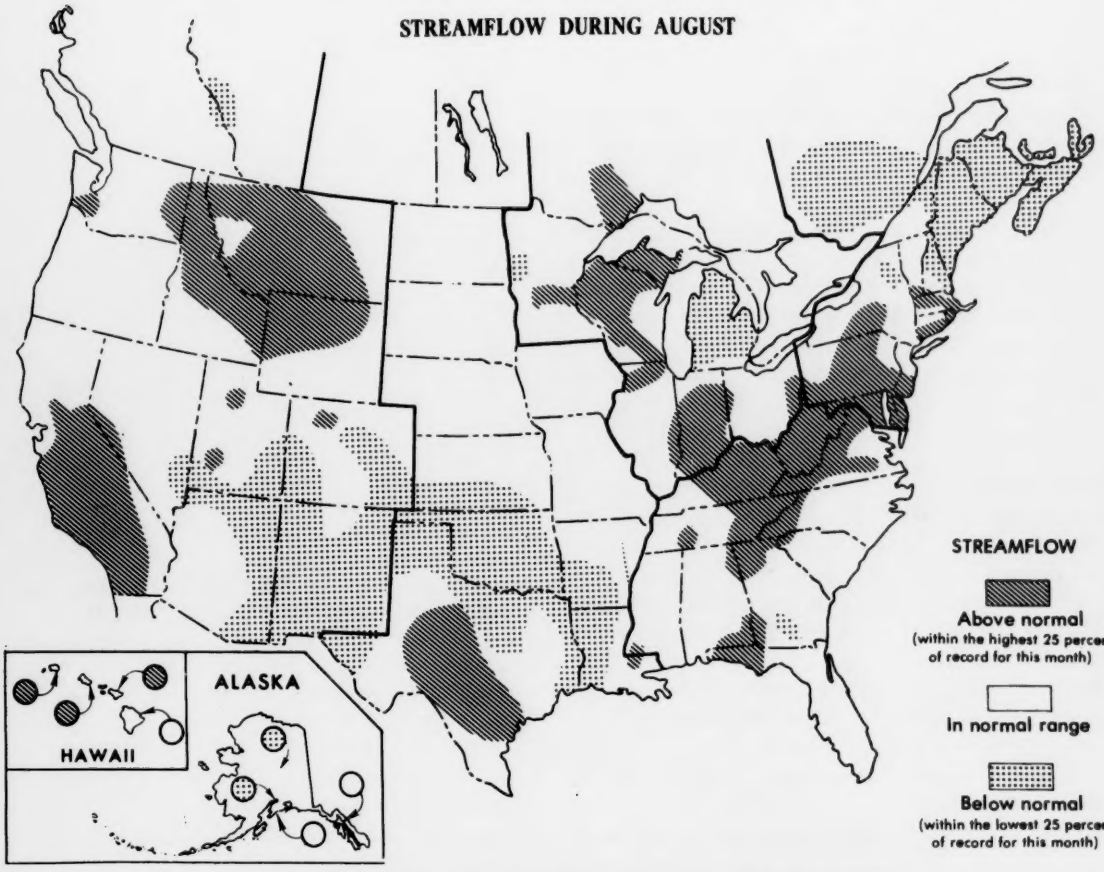
WATER RESOURCES REVIEW for AUGUST 1978

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH



STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally increased in the Southeast Region and in the southern half of the Northeast Region, was variable in Alaska, Arizona, Hawaii, Kansas, Nebraska, and New Mexico, and generally decreased seasonally elsewhere.

Above-normal streamflow persisted in parts of Florida, Hawaii, Maryland, New Jersey, Pennsylvania, most States in the Western Great Lakes Region, and several western States. Flooding occurred in parts of Indiana, Kentucky, South Dakota, Texas, Virginia, and Wisconsin. Monthly or daily mean flows were highest of record for the month in parts of Louisiana and Michigan and lowest of record in central Maine.

Flows remained below the normal range in parts of the Atlantic Provinces, Quebec, Alaska, Georgia, Maine, Michigan, Minnesota, New York, and several southwestern States, and decreased into that range in parts of Alberta and Oklahoma.

Ground-water levels continued to decline seasonally in most of the Northeast Region, and were near or above average except in Maine. In the Southeast Region, levels generally declined seasonally in North Carolina, Mississippi, Alabama, and Georgia; mixed trends prevailed in most of the other States in the region. Levels were above average in Kentucky and Virginia, below average in Alabama and Georgia, and mixed elsewhere. In the Western Great Lakes Region, except for general seasonal declines in Wisconsin and Michigan, trends were mixed, as were levels with respect to average. In the Midcontinent and West, trends were mixed except for general seasonal declines in Nebraska, Iowa, Kansas, Washington, Arizona, and New Mexico. Levels were below average in Arkansas, Texas, Idaho, Montana, Arizona, and New Mexico, and in most of Kansas and Utah; they were above and below average elsewhere.

A new August high level occurred in Arizona. New lows for August were recorded in Alabama, Arizona, Arkansas, Idaho, Louisiana, Montana, and Texas. New alltime lows occurred in Alabama, Arkansas, Idaho, Kansas, and Nevada.

NORTHEAST

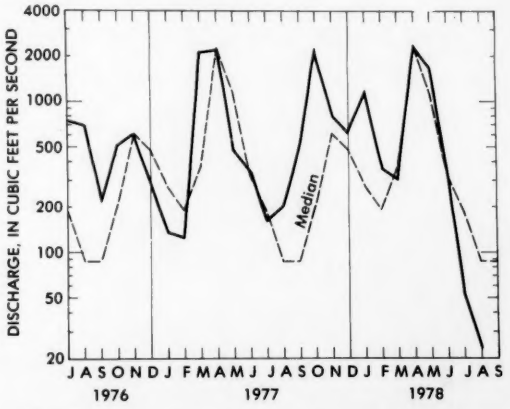
[Atlantic Provinces and Quebec; Delaware, Maryland, New Jersey, New York, Pennsylvania, and the New England States]

Streamflow continued to decrease seasonally in the Atlantic Provinces, Maine, and Quebec, but increased, contrary to the normal seasonal pattern of decreasing flows, in parts of the central and southern States of the region. Monthly mean flows remained below the normal range in parts of the Atlantic Provinces, Maine, New York, and Quebec. Flows remained in the above-normal range in parts of Maryland, New Jersey, and Pennsylvania, and increased into that range in parts of the New England States and New York. Flows were lowest of record for August in central Maine.

Water levels continued the seasonally declining trend in most northern and central parts of the region. However, levels changed only slightly or rose in much of Delaware, Maryland, New Jersey, and southeastern Pennsylvania. Levels continued above average in most of central Pennsylvania and southern New England, were below average in Maine, and generally near average elsewhere.

In southern Nova Scotia, monthly mean flow of LaHave River at West Northfield remained below the normal range for the 3d consecutive month and was only $^1/_3$ the median flow for August. In the adjacent areas of southeastern New Brunswick, mean flow in Lepreau River at Lepreau decreased sharply, remained below the normal range, and was only 21 percent of median. In the northern part of the Province, mean flow of Upsalquitch River at Upsalquitch also decreased sharply and was below the normal range.

In Maine, monthly mean discharge remained in the below-normal range at all index stations. In the central part of the State, the mean discharge of 24.2 cfs in Piscataquis River near Dover-Foxcroft (drainage area, 297 square miles), was lowest for August in 76 years of record. (See graph.) In southern Maine, flow in Little Androscoggin River near South Paris (drainage area, 76.2 square miles) decreased sharply to 4.6 cfs, the 2d lowest monthly mean discharge for August in 57 years of record. In the northern part of the State, mean flow of St. John River below Fish River, at Fort Kent, also decreased sharply, remained in the below-normal range and was only 45 percent of median.



Monthly mean discharge of Piscataquis River near Dover-Foxcroft, Maine (Drainage area, 297 sq mi; 769 sq km)

In Quebec, mean flows decreased at all index stations and remained below the normal range in St. Maurice River at Grand Mere and Coulonge River near Fort Coulonge. In the southwestern part of the Province, monthly mean discharge in Harricana River at Amos decreased into the below-normal range.

In the New England States, mean flow increased, contrary to the normal seasonal pattern of decreasing flows, in Branch River at Forestdale, R.I., Ware River at Coldbrook, Mass., Pomperaug River at Southbury,

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Conn., and Salmon River near East Hampton, Conn., and was above the normal range at all four stations. In central New Hampshire, monthly mean flow in Pemigewasset River at Plymouth decreased sharply and was below the normal range. In central Vermont, monthly mean flow in White River at West Hartford continued to decrease seasonally and remained within the normal range. Monthly mean discharge of Branch River at Forestdale, R.I., has been greater than median for 12 consecutive months.

In New York and New Jersey, monthly mean flows increased at all index stations, contrary to the normal seasonal pattern. In the southern part of New Jersey, mean discharge in Great Egg Harbor River at Folsom remained in the above-normal range for the 4th consecutive month. Elsewhere in the State, mean flows were in the normal range.

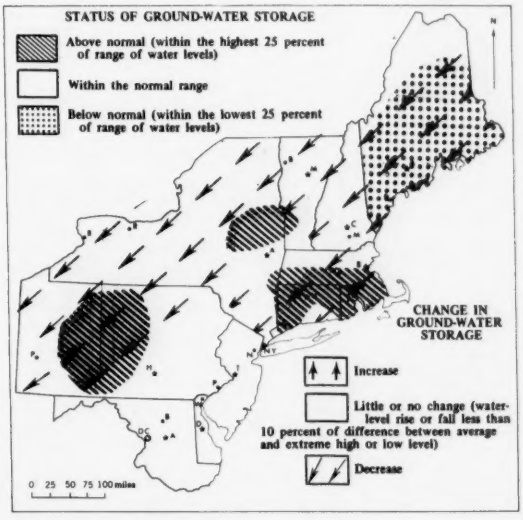
In eastern New York, monthly mean discharge in Hudson River at Hadley increased unseasonally but, because of low carryover flow from July, remained below the normal range. In the south-central part of the State, mean flow in Susquehanna River at Conklin increased into the above-normal range as a result of sharply increased runoff from rains early in the month.

Downstream in Pennsylvania, monthly mean flow of Susquehanna River at Harrisburg also increased, and was twice the median flow for the month. In the extreme southwestern part of the State, mean flow in Monongahela River at Braddock decreased seasonally but remained above the normal range as a result of high carryover flow from July. Mean flows at other index stations in the State decreased seasonally and were in the normal range.

In central Maryland, high carryover flow from July, augmented by increased runoff early in August, held monthly mean flow of Seneca Creek at Dawsonville in the above-normal range for the 4th consecutive month. In the Choptank River basin in eastern Maryland, where mean flow near Greensboro was above the normal range in July, monthly mean discharge increased sharply, was 613 percent of the median flow for August, and remained in the above-normal range.

Monthly mean flow of Potomac River near Washington, D.C. increased sharply, as a result of runoff from rains early in the month, remained in the above-normal range, and was 367 percent of the August median flow.

Ground-water levels continued to decline seasonally in most of the region. (See map.) However, levels changed only slightly in some central and southern parts of the region and rose in scattered areas of locally heavy recharge. Levels near end of month remained above average in much of southern New England and central Pennsylvania, and were above average also in east-central New York. Levels were below average in most of Maine.



Map shows ground-water storage near end of August and change in ground-water storage from end of July to end of August.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

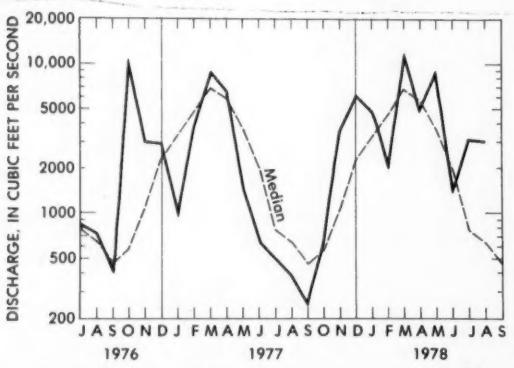
Streamflow decreased seasonally in Mississippi, increased seasonally in Florida, was variable in South Carolina, and generally increased, contrary to the normal seasonal pattern of decreasing flows, in other States of the region. Monthly mean flows remained in the above-normal range in parts of Florida, Virginia, and West Virginia, and increased into that range in parts of Georgia, Kentucky, North Carolina, and Tennessee. Flows remained in the below-normal range in parts of Georgia. Minor flooding occurred in Kentucky and Virginia.

Ground-water levels generally declined seasonally in North Carolina, northeastern Mississippi, Alabama, and Georgia, and were mixed elsewhere in the region. Levels were above average in Kentucky and Virginia, below average in Alabama and Georgia, and mixed in other States. A new high for August was reached in Kentucky, and a new alltime low occurred in Alabama.

Minor flooding occurred along some small streams in northern and southeastern Virginia as a result of rapid runoff from numerous thunderstorms during the month, and monthly mean flows increased contrary to the

normal seasonal pattern of decreasing flows. For example, mean flows in Rapidan River near Culpeper and Nottaway River near Stony Creek increased 38 and 64 percent, respectively, from the mean flows during July, compared with normal seasonal decreases of 27 and 32 percent.

Similarly in West Virginia, mean flow in Greenbrier River at Alderson increased 89 percent, compared with a normal seasonal decrease of 25 percent from July to August. In extreme northern West Virginia, mean flow in Potomac River at Paw Paw decreased slightly but, as a result of high carryover flow from July, remained above the normal range and was 467 percent of median. (See graph.)



Monthly mean discharge of Potomac River at Paw Paw, W. Va. (Drainage area, 3,109 sq mi; 8,052 sq km)

Minor flooding was reported also in Kentucky. In the northern part of that State, mean flow of Licking River at Catawba increased 304 percent from July, compared with a normal seasonal decrease of 52 percent, was above the normal range, and was 826 percent of the August median flow. In southern Kentucky, mean flow in Green River at Munfordville also increased, contrary to the normal seasonal pattern, was 2½ times median, and was above the normal range.

In east-central Tennessee, where monthly mean flow of Emory River at Oakdale normally decreases 28 percent from July to August, mean discharge increased 96 percent and was 5½ times the August median flow. Similarly, in the extreme eastern part of the State, mean flow of French Broad River below Douglas Dam increased 104 percent, in contrast to the normal seasonal decrease of 23 percent, and was above the normal range.

In Mississippi and the adjacent area of northern Alabama, monthly mean flows decreased and remained below median. In southeastern Alabama, monthly mean discharge of Conecuh River at Brantley increased sharply and was about 1½ times median.

In the adjacent area of northwestern Florida, mean flow of Shoal River near Crestview also increased, and remained above median and in the above-normal range for the 8th consecutive month. Mean flows of other streams in that part of the State have been greater than median during the past several months. Monthly mean flows in St. John River, in east-central Florida, and in Fisheating Creek in the south-central part of the State, increased sharply and were 3½ times their respective median flows for August. Elsewhere in the State, flows were in the normal range.

In extreme northwestern Georgia, mean flow in Etowah River at Canton increased 185 percent, in contrast to the normal seasonal decrease of 22 percent, and was 279 percent of median. In the Apalachicola River basin, adjacent to the western boundary of Georgia, monthly mean flow as measured at the index station at the Georgia-Florida boundary town of Chattahoochee, Florida, increased 74 percent, contrary to the normal seasonal decrease of 9 percent, and was in the above-normal range. In south-central Georgia, mean discharge in Alapaha River at Statenville decreased seasonally and was only 54 percent of median, partly because of low carryover flow from July.

In extreme western North Carolina, mean flow in French Broad River at Asheville increased 114 percent, contrary to the normal seasonal decrease of 17 percent from July to August, as a result of sharply increased runoff from rains in that basin early in the month. Elsewhere in North Carolina and South Carolina, mean flows increased in some basins and decreased in others but were only slightly greater than median, and were in the normal range.

Ground-water levels in West Virginia rose in the central and southwestern half of the State and declined elsewhere. Levels were below average in the southeastern third of the State but were above average elsewhere. In Kentucky, levels declined seasonally except in the Louisville-Jefferson County area, where they continued to rise; the level in the key well in Louisville reached a new August high in 32 years of record. Levels were above average in most parts of the State. Levels in Virginia declined more than a foot in the Bacon-Summerville well in the northern part of the State and in the Tyler well in Louisa County, but rose slightly in the Matoaka Manor well near Petersburg; levels were above average in all three observation wells. In western Tennessee, the artesian level in the key well in the "500-foot sand" near Memphis rose nearly a foot but continued below average by nearly 14½ feet. In North Carolina, levels declined statewide; they were above average in the mountains and in the Piedmont, but below average in the Coastal Plain. Levels declined

significantly in northeastern Mississippi owing to the dry conditions in that part of the State. Levels generally declined in Alabama; the level in the key well in Centreville reached a new alltime low in 26 years of record. In Georgia, levels in the principal artesian aquifer held steady in some wells but declined as much as 4 feet in others. The level in the Cockspur Island well in the Savannah area declined about 1/3 foot and was 7½ feet below average. In southwestern Georgia, levels held steady or declined as much as 1 foot during August but ranged up to 7 feet above those of a year ago. In Florida, levels rose in most areas in the north and in the central peninsula, but declined locally in Jacksonville and near Tampa. Levels were 6 feet below average in Jacksonville, and 1.4 feet above average at Pensacola. In the southeast, trends were mixed, as were levels with respect to average.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

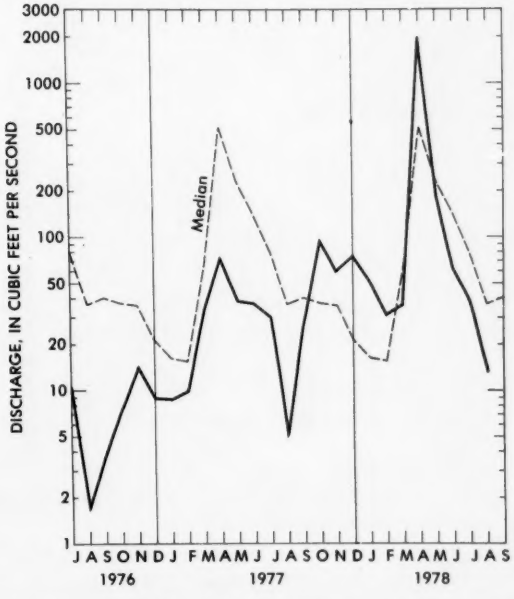
Streamflow decreased seasonally throughout the region except in parts of Indiana and Michigan, where flows increased in contrast to the normal seasonal pattern of decreasing flows. Monthly mean discharges remained in the above-normal range in parts of Illinois, Indiana, Minnesota, Ohio, Ontario, and Wisconsin, and increased into that range in northern Michigan. Flows remained below the normal range in parts of Michigan and Minnesota. Minor flooding occurred in Indiana and Wisconsin, and monthly mean flows were highest for the month in part of Michigan.

Ground-water levels declined in Wisconsin, Michigan, and northern Illinois; trends were mixed in other States. Levels were near or above average in Wisconsin, above average in northern Illinois and in Ohio, mixed in Minnesota, and mostly below average in Michigan.

In the western part of Michigan's Upper Peninsula, the monthly mean discharge of 328 cfs in Sturgeon River near Sidnaw (drainage area, 171 square miles) was highest for August in 38 years of record. The daily mean discharge of 1,100 cfs on the 24th was only 15 percent less than the maximum daily mean of record for the month, which occurred in 1951. In the Lower Peninsula, mean flows generally remained in the below-normal range. The monthly mean discharge of Red Cedar River at East Lansing has been below the normal range for 3 consecutive months and was only ½ of the respective median flows for those months.

In southwestern Ontario, mean flow of English River at Umfreville decreased seasonally but was in the above-normal range as a result of high carryover flow from July. Elsewhere in the Province, mean flows were generally near median but within the normal range.

In western Minnesota, monthly mean discharge of Buffalo River near Dilworth continued to decrease seasonally and remained below the normal range as a result of low carryover flow from July. (See graph.) In the central part of the State, mean flow of Crow River at Rockford increased sharply, in contrast to the normal seasonal pattern of decreasing flow, was 4 times the August median, and was above the normal range. Elsewhere in the State, mean flows decreased seasonally and remained within the normal range.



Monthly mean discharge of Buffalo River near Dilworth, Minn. (Drainage area, 1,040 sq mi; 2,690 sq km)

In adjacent Wisconsin, monthly mean flows decreased seasonally in all parts of the State, but generally were above the normal range as a result of high carryover flows from July. In the northwestern part of the State, where mean discharge of Jump River at Sheldon was 465 percent of median in July, mean flow decreased seasonally but was 378 percent of median and in the above-normal range. Minor flooding occurred along small streams in this part of Wisconsin during the latter part of the month as a result of rapid runoff from intense thunderstorm rainfall. In eastern Wisconsin, mean flow of Fox River at Rapide Croche Dam, near Wrightstown,

(Continued on page 7.)

Provisional data: subject to revision

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie, 1.57; Ontario, 1.22.)

Lake	August 31, 1978	Monthly mean, August		August		
		1978	1977	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	601.23	601.04	600.74	601.00	602.02 (1950)	599.15 (1926)
Michigan and Huron (Harbor Beach, Mich.)	579.01	578.97	578.52	578.64	580.99 (1973)	575.97 (1964)
St. Clair (St. Clair Shores, Mich.)	574.41	574.46	574.22	573.72	576.03 (1973)	571.60 (1934)
Erie (Cleveland, Ohio)	571.55	571.66	571.53	570.73	573.03 (1973)	568.36 (1934)
Ontario (Oswego, N.Y.)	244.93	245.20	245.12	245.13	247.45 (1947)	242.26 (1934)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	August 31, 1978	August 31, 1977	Reference period 1904–77		
			August average, 1904–77	August maximum (year)	August minimum (year)
Elevation in feet above mean sea level:	4,198.70	4,199.25	4,198.0	4,204.1 (1923)	4,191.65 (1963)

LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1977): 102.1 (1869). Alltime low (1939–1977): 92.17 (1941).	August 30, 1978	August 31, 1977	Reference period 1939–75		
			August average, 1939–75	August max. daily (year)	August min. daily (year)
Elevation in feet above mean sea level:	94.84	95.06	94.96	97.93 (1972)	93.39 (1949)

FLORIDA

Site	August 1978		July 1978	August 1977
	Discharge in cfs	Percent of normal	Discharge in cfs	Discharge in cfs
Silver Springs near Ocala (northern Florida)	800	102	810	650
Miami Canal at Miami (southeastern Florida)	375	126	262	247
Tamiami Canal outlets, 40-mile bend to Monroe	452	112	694	187

(Continued from page 5.)
decreased to 106 percent of median and was in the normal range.

In northern Illinois, where mean flow of Rock River near Joslin was 4½ times median and above the normal range during July, mean discharge decreased seasonally but was 180 percent of median and remained in the above-normal range. In the southern part of the State, monthly mean flow of Skillet Fork at Wayne City continued to decrease seasonally but remained in the normal range.

In Indiana, monthly mean discharge decreased seasonally in northern and western basins but remained above the normal range. Mean flow of Wabash River at Mt. Carmel, Illinois, on the Illinois-Indiana border, decreased but was 216 percent of the August median flow, and was in the above-normal range. In southeastern Indiana, monthly mean discharge of East Fork White River at Shoals, increased unseasonally, was 5 times the August median discharge, and remained in the above-normal range. Flash flooding was reported along some small streams in the southeastern part of the State, and the National Weather Service observed that this was the 3d wettest August of record in terms of statewide rainfall. In the northeastern part of Indiana, mean flow in Mississinewa River at Marion decreased seasonally, but remained in the above-normal range as a result of high carryover flow from July.

Monthly mean flows were above normal in parts of the Miami and Whitewater River basins, in southwestern Ohio and the adjacent areas of southeastern Indiana. In northeastern Ohio, mean flow of Little Beaver Creek near East Liverpool continued to decrease seasonally but was 279 percent of median and remained in the above-normal range for the 4th consecutive month, partly as a result of high carryover flow from July. In the northwestern and central parts of the State, mean flows of Maumee River at Waterville and Scioto River at Higby, respectively, decreased seasonally and were in the normal range.

Ground-water levels in shallow water-table wells in Minnesota rose and continued below average in the northern part of the State, but declined and were above average in the southern part. Artesian levels in the Minneapolis-St. Paul area continued to decline in wells tapping the Prairie du Chien-Jordan aquifer and the deeper Mt. Simon-Hinckley aquifer; levels in both continued below average. In Wisconsin, levels in the deeper sandstone aquifers continued to decline in the heavily-pumped areas of Milwaukee and Green Bay. Levels in shallow aquifers generally declined, but were near or above average. In Michigan, levels declined statewide and were below average in most areas. In northern Illinois, the level in the shallow index well in glacial drift at Princeton, in Bureau County, continued to decline, but was still above average. Levels declined in northeastern Ohio but continued about average; in central Ohio, levels generally held steady and were above average.

MIDCONTINENT

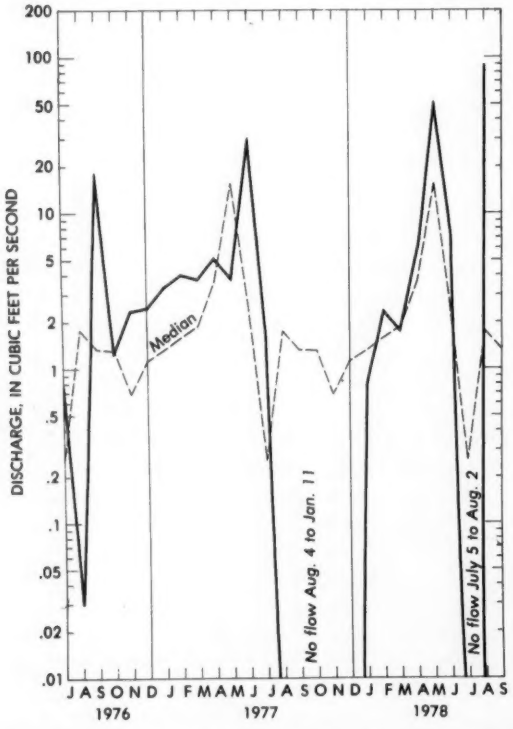
[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

Streamflow increased in parts of Saskatchewan, Kansas, Louisiana, Nebraska, and Texas, contrary to the normal seasonal pattern of decreasing flows, and decreased seasonally elsewhere in the region. Monthly mean flows remained in the below-normal range in parts of Arkansas, Kansas, Louisiana, and Texas, and decreased into that range in parts of Oklahoma. Drought conditions continued in eastern Texas and many streams remained dry in southwestern Nebraska. Flooding occurred in South Dakota and Texas.

Ground-water levels declined in Nebraska and Kansas, and in most areas in Iowa; mixed trends prevailed elsewhere in the region. Levels were mostly above average in Nebraska and Iowa, mostly below average in Kansas, below average in Arkansas and Texas, and mixed in other States. New August lows occurred in Arkansas, Louisiana, and Texas, and new alltime lows were reached in Kansas and Arkansas.

In central Texas, rapid runoff from intense rainfall associated with tropical storm Amelia, resulted in extremely severe flooding in parts of the Brazos, Colorado, Guadalupe, Nueces, and San Antonio River basins early in the month. Rainfall intensities in excess of 30 inches in 36 hours were reported to have occurred in storm centers near Kerrville and Abilene. The storm was described as moving into south-central Texas, to the vicinity of Kerrville, thence northward to the Abilene-Wichita Falls area, in the north-central part of the State. Peak flood stages that exceeded those for the period of record occurred at the following streamflow stations: Clear Fork Brazos River at Fort Griffin, Clear Fork Brazos River at Eliasville, Millers Creek near Munday, California Creek near Stamford, Brazos River near South Bend, Guadalupe River at Comfort, Guadalupe River near Spring Branch, Medina River near Pipe Creek, North Fork Hubbard Creek near Albany, Hubbard Creek below Albany, and Beaver Creek near Mason. In North Concho River, tributary to Colorado River near San Angelo, the monthly mean discharge at the index station

near Carlsbad was 51 times the median discharge for August. (See graph.) Mean flows were below the normal range in streams in parts of eastern Texas and in the panhandle, and were in the normal range in the southern and western parts of the State.



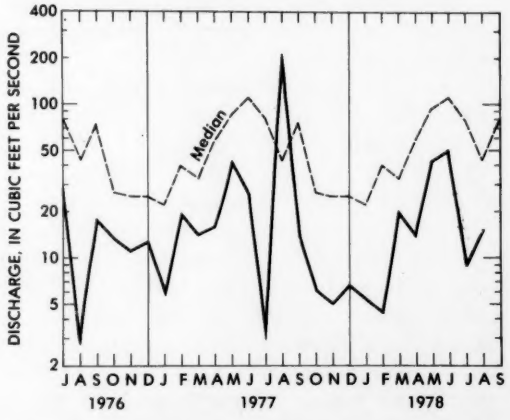
Monthly mean discharge of North Concho River near Carlsbad, Tex. (Drainage area, 1,249 sq mi; 3,235 sq km)

In western Louisiana, monthly mean flows continued to decrease seasonally and remained below the normal range for the 5th time in the past 6 months in Saline Bayou near Lucky and Calcasieu River near Oberlin. In contrast, in the southeastern part of the State, the daily mean discharge of 20,000 cfs on the 31st, at the index station, Amite River near Denham Springs (drainage area, 1,280 square miles) was highest for August in record that began in September 1938.

In southern Arkansas, the mean flow in Saline River near Rye continued to decrease seasonally, remained in the below-normal range, and was only 26 percent of the August median.

In southern Oklahoma, the monthly mean discharge of Washita River near Durwood decreased into the below-normal range and was only 38 percent of median.

Similarly, in southern Kansas, the mean flow in Arkansas River at Arkansas City decreased into the below-normal range and was 31 percent of the August median discharge. In the northwestern part of the State, where monthly mean discharge in Saline River near Russell was below the normal range and only 11 percent of median in July, mean flow increased, contrary to the normal seasonal pattern of decreasing flows, and was in the normal range. (See graph.)



Monthly mean discharge of Saline River near Russell, Kans. (Drainage area, 1,502 sq mi; 3,890 sq km)

In Missouri, Iowa, and the adjacent area of eastern Nebraska, monthly mean flows at all index stations decreased seasonally, were greater than the median flows for August, and were in the normal range. In the panhandle area of northwestern Nebraska, mean flow of Niobrara River increased, in contrast to the normal seasonal pattern, as a result of runoff from rains during the first week in August. In the Republican River basin of extreme southwestern Nebraska, Enders Reservoir (Frenchman Creek), Hugh Butler Lake (Red Willow Creek), and Harry Strunk Lake (Medicine Creek) were at new record-low elevations at monthend. Most streams in that area were dry all month.

In eastern South Dakota, runoff from intense rains near Watertown on August 26 caused some lowland flooding and damage to secondary roads. Monthly mean streamflows decreased seasonally and remained within the normal range elsewhere in the State.

In North Dakota, monthly mean flows continued to decrease seasonally, were greater than median flows for the month, and were in the normal range. Runoff from isolated thunderstorms that occurred during the month was reported to have had a minor effect on streamflows.

In southeastern Saskatchewan, the monthly mean discharge of Qu'Appelle River near Lumsden increased, contrary to the normal seasonal pattern of decreasing flow in that area, but was less than the August median and was in the normal range. Mean flow at that station

was in the below-normal range during 5 of the past 8 months.

In southern Manitoba, the monthly mean flow of Waterhen River below Waterhen Lake continued to decrease seasonally, was 73 percent of median for August, and remained in the normal range for the 23d consecutive month. The level of Lake Winnipeg at Gimli averaged 714.65 feet above mean sea level for the month, 0.23 foot higher than last month, 2.82 feet higher than last August, and 0.29 foot higher than the long-term average for August. The record of Lake Winnipeg levels began in 1913 at Winnipeg Beach.

Ground-water levels in North Dakota rose and were above average in the west, but declined and were below average in the east. Levels declined statewide in Nebraska, but were above average except in the northwestern part of the State. In Iowa, levels in shallow water-table wells declined except in the extreme southwest corner of the State; levels were above average except in the northeast corner. Levels in Kansas declined statewide for the third consecutive month owing to persistent lack of significant precipitation. A new alltime low in 31 years of record, for the second consecutive month, was reached in the well at Colby, in Thomas County, in the northwest Kansas high plains. Levels were below average except in the northeastern part of the State. In the rice-growing area of east-central Arkansas, the water level in the shallow Quaternary aquifer rose slightly, and was in the range that has prevailed since 1961. The level in the deep aquifer—the Sparta Sand—declined about 6½ feet, and was about 72 feet below the average for August, setting a new alltime low in 11 years of record. In the industrial aquifer of central and southern Arkansas, the level in the key well at Pine Bluff declined slightly and was about 16½ feet below average, setting a new August low in 12 years of record. In Louisiana, levels in key wells of the Chicot aquifer in the southwest rose, marking the end of the rice irrigation season. Levels in key wells in the Evangeline aquifer in the Opelousas and Eunice areas declined and reached record lows. In the Florida Parishes, levels in the deeper sands have declined, but rose in the upland terrace deposits. Levels in the Baton Rouge-New Orleans area were higher than a year ago and showed normal seasonal fluctuations because of pumping. In Texas, levels rose in key wells in the Edwards Limestone at San Antonio and in the bolson deposits at El Paso, and declined in the Edwards Limestone at Austin and in the Evangeline aquifer at Houston. Levels were below average in all these wells; despite the slight rise in the key well at El Paso, the level was at a new August low in 20 years of record.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

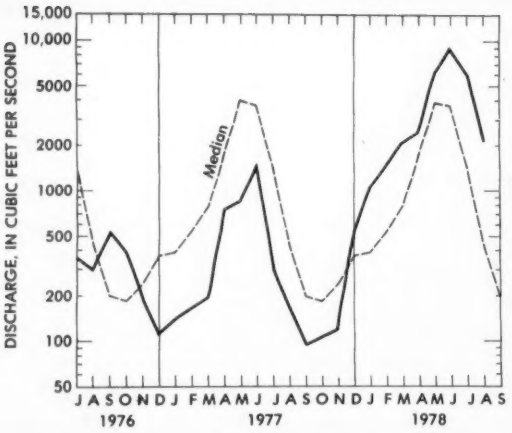
Streamflow generally decreased seasonally in most of the region but was variable in Arizona and New Mexico. Monthly mean flows remained in the above-normal range in parts of California, Colorado, Idaho, Montana, Utah, and Wyoming, and increased into that range in parts of Washington. Flows persisted in the below-normal range in parts of Arizona, Colorado, and New Mexico, and decreased into that range in parts of Alberta and Utah. Decreasing flows in parts of Arizona and New Mexico were contrary to the normal seasonal pattern of increasing monthly mean flows.

Ground-water levels declined in Washington and New Mexico, and in most of Arizona; trends were mixed elsewhere in the region. Levels were below average in Montana, Arizona, and New Mexico, and in most of Idaho; they were above and below average in other States. New August low levels were recorded in Idaho, Montana, and Nevada; in Arizona, four new August lows were observed, and a new August high level occurred. In Idaho, an alltime low level was equaled and a new alltime low was recorded.

In southern California, high carryover flow from July in Arroyo Seco near Pasadena held monthly mean discharge in the above-normal range for the 10th consecutive month. Cumulative runoff at this station for the first 11 months of the 1978 water year was 9 times median. In central California, in the southern part of the Sierra Nevada, streamflow continued to be much above normal from the near-record accumulation of snow, particularly in the Kings, Kaweah, and Kern River basins. For example, monthly mean flow in Kings River above North Fork, near Trimmer, on the Sierra Nevada west slope, was almost 5 times median and remained in the above-normal range for the 4th consecutive month. (See graph on page 10.) On the central Sierra Nevada east slope, monthly mean flow of West Walker River below Little Walker River, near Coleville, continued to decrease seasonally but remained in the above-normal range for the 3d consecutive month. Combined contents of 10 of the major reservoirs in northern California were 117 percent of average and 3.5 times that of a year ago.

In Oregon, streamflow decreased seasonally at all index stations, was near or slightly above median, and within the normal range.

In Washington, streamflow decreased seasonally but remained above median throughout the State. In the



Monthly mean discharge of Kings River above North Fork, near Trimmer, Calif. (Drainage area, 952 sq mi; 2,466 sq km)

southwestern part of the State, monthly mean discharge in Chehalis River near Grand Mound decreased seasonally, but was above the normal range as a result of increased runoff from rains near monthend. In the eastern part of the State, monthly mean flow in Spokane River at Spokane also decreased seasonally but was above the normal range and 131 percent of median.

In Alberta, monthly mean flows decreased seasonally and were below the normal range in Bow River at Banff, but were in the normal range in Athabasca River at Hinton. In British Columbia, monthly mean flows at both index stations also decreased seasonally and were near or slightly below median.

In southeastern Idaho, monthly mean flow of Snake River near Heise decreased seasonally but remained in the above-normal range for the 3d consecutive month. In the east-central part of the State, mean flows in Salmon River at White Bird and Clearwater River at Spalding also decreased seasonally but remained in the above-normal range. Elsewhere in the State, flows in Kootenai, Weiser, and Boise Rivers were generally in the normal range. Storage was above average in most reservoirs.

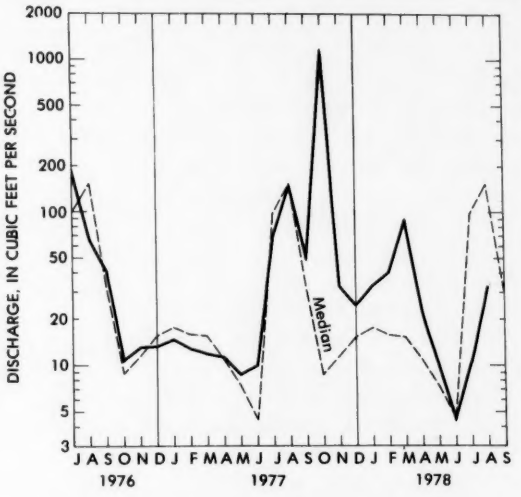
In Montana, flows were generally in the above-normal range except in the lower Clark Fork River basin where runoff was in the normal range. Monthly mean discharge at index stations on the Yellowstone River at Corwin Springs and at Billings remained in the above-normal range for the 2d consecutive month.

In north-central Wyoming, mean flow in Tongue River near Dayton decreased seasonally but remained in the above-normal range for the 3d consecutive month. In the south-central part of the State, monthly mean flow in North Platte River above Seminoe Reservoir, near Sinclair, decreased seasonally to 152 percent of median and was within the normal range. Storage in all key reservoirs decreased during the month.

In northern Utah, mean flow in Big Cottonwood Creek near Salt Lake City continued to decrease seasonally, was 142 percent of median, and remained in the above-normal range for the 3d consecutive month. In the southwestern part of the State, monthly mean discharge in Beaver River near Beaver was above the normal range and nearly 2 times the median flow. In contrast, monthly mean flows in Colorado River near Cisco and San Juan River near Bluff, in southeastern Utah, were below the normal range. Statewide, streamflow averaged 96 percent of median at the seven index stations, compared to 57 percent a year ago.

In northeastern Nevada, monthly mean discharge in Humboldt River at Palisade continued to decrease seasonally to 74 percent of median but remained in the normal range for the 13th consecutive month.

In northwestern Arizona and the adjacent areas of Nevada and Utah, monthly mean flow in Virgin River as measured at Littlefield, Ariz., decreased, contrary to the normal seasonal pattern of increasing flows, and was below the normal range for the first time since December 1977. In southeastern Arizona, where monthly mean flow during July in San Pedro River at Charleston was lowest of record, streamflow increased seasonally to 22 percent of median but remained in the below-normal range. (See graph.) Elsewhere in the State, monthly mean discharge in Gila River at head of Safford Valley, near Solomon, and Little Colorado River near Cameron increased seasonally but remained in the below-normal range.



Monthly mean discharge of San Pedro River at Charleston, Ariz. (Drainage area, 1,219 sq mi; 3,157 sq km)

In New Mexico, streamflow was below the normal range throughout the State with the exception of the Upper Rio Grande, which was in the normal range. Monthly mean discharges at the index stations, Delaware River near Red Bluff and Gila River near Gila, remained in the below-normal range for the 2d consecutive month.

In southwestern Colorado, west of the Continental Divide, monthly mean flow in Animas River at Durango decreased sharply and was below the normal range for the first time in 6 months. In north-central Colorado, east of the Divide, mean flow in Bear Creek at Morrison continued to decrease seasonally, was only 15 percent of the median flow, and remained in the below-normal range for the 3d consecutive month. In contrast, monthly mean discharge in Yampa River at Steamboat Springs, west of the Divide, remained in the above-normal range for the 3d consecutive month.

Contents of the Colorado River Storage Project decreased 857,820 acre-feet during the month.

Ground-water levels in Washington declined in the key well at Spokane but was about a foot above average, and declined and continued nearly 3 feet below average in the well at Sumas in the western part of the State. In Idaho, the level in the well penetrating the sand and gravel aquifer in the Boise Valley continued its seasonal rise and was above average. In the key wells representative of the Snake River Plain aquifer, a new alltime low level was reached in the eastern part and the alltime low of 1963 was equaled in the south-central part. Despite rises, new August lows occurred in the key wells in the southwestern and western parts of the Snake River Plain aquifer. The level in the well representative of the alluvial aquifer underlying the Rathdrum Prairie, northern Idaho, continued to rise slightly but nevertheless was nearly 10 feet below average. In Montana, the level in the water-table well in Quaternary gravel in Missoula declined less than a foot and was about a foot below average. The level in the Hamilton Fairgrounds water-table well in alluvium rose slightly but was at a new low for August in 8 years of record. In southern California, levels showed mixed trends. In Santa Barbara County, the level declined but continued above average in the observation well in the upper Cuyama Valley, rose and continued above average in Santa Ynez Valley, and rose but continued below average in Santa Maria Valley. In Los Angeles County, the water-table well at Baldwin Park declined and continued below average; the artesian level in the key well in Orange County rose but continued below average. In Nevada, the level rose 1½ feet in the Las Vegas well, but was at a new alltime low in more than 30 years of record. Levels rose and were above average in Steptoe Valley, and declined but were above average in Paradise Valley; the level declined and was below average in the well at Truckee Meadows. In Utah, levels generally rose in much of the State except in the Flowell area, where the artesian level in the key well declined nearly 9 feet. Levels were generally below-average except in the Blanding area, where the level was slightly above average. In Arizona, levels declined in four index wells and held steady in one. New August lows were measured in four of the index wells, including the City of Tucson No. 2 well (10 years of record), and the well in the Elfrida area (27 years of record). In New Mexico, levels continued to decline in most of the key wells owing to heavy pumping for irrigation; levels continued below average.

ALASKA

Streamflow generally decreased except in the interior basin of Tanana River, where mean flow at Nenana increased and returned to normal (after being below the normal range for 2 months) as a result of above-normal temperatures which increased runoff from glaciers in the basin. Also in the interior, mean flow of Chena River at Fairbanks decreased, contrary to the normal seasonal pattern of increasing flow at that station, because of the absence of high-altitude snowpack in the basin and a general lack of precipitation during the month. Monthly mean discharge at Fairbanks was only 50 percent of median and remained below the normal range for the 4th consecutive month. In south-central Alaska, monthly mean flow of Little Susitna River near Palmer decreased seasonally and returned to the below-normal range. At the coastal and southeastern index stations of Kenai River at Cooper Landing and Gold Creek at Juneau, respectively, mean flows decreased seasonally and remained within the normal range.

In the Anchorage area, ground-water levels rose slightly in water-table wells, and were fairly stable in confined aquifers except for declines of several feet near pumping centers.

HAWAII

Streamflow increased sharply and remained in the above-normal range for the 3d consecutive month at index stations on the islands of Kauai and Maui. On the island of Oahu, where mean flow of Kalihi Stream near Honolulu in July was in the normal range, monthly mean discharge also increased sharply and was above the normal range. Conversely, on the island of Hawaii, where mean flow in Waiakea Stream near Mountain View was in the above-normal range in June and July, monthly mean discharge decreased and was in the normal range.

On Guam, Mariana Islands, monthly mean flow of Ylig River near Yona increased sharply as a result of runoff from about 10 inches of rain associated with tropical storm Carmen, but remained within the normal range for the 3d consecutive month.

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR AUGUST AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	August data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1978	6,365	109	136	2,100	1,220	4,330	25.0	22.5	26.5
		1945–77 (Extreme yr)	6,388	67 (1945)	158 (1967)	.....	505 (1965)	21,500 (1955)	.....	17.5	31.5
			[c]4,268								
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y.	1978	278,000	166	170	125,000	124,000	129,000	22.5	22.0	23.0
		1976–77 (Extreme yr)	293,000	166 (1976, 1977)	167 (1976, 1977)	132,000	113,000 (1977)	153,000 (1976)	21.0	19.0	22.5
	median streamflow at Ogdensburg, N.Y.		[c]252,000								
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss.	1978	396,500	242	290	272,000	200,000	345,000	32.0	29.5	34.0
		1976–77 (Extreme yr)	294,800	213 (1977)	260 (1976)	197,000	118,000 (1977)	271,000 (1977)	29.0	27.5	31.0
			[c]317,600								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	1978	150,200	195	270	.....	42,300	141,000	.....	26.5	29.5
		1955–77 (Extreme yr)	130,400	128 (1963)	339 (1977)	.....	20,300 (1965)	246,000 (1958)	.....	17.0	30.5
			[c]102,200								
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1978	80,140	307	418	80,700	72,700	96,200	26.0	25.0	28.0
		1976–77 (Extreme yr)	52,200	295 (1977)	436 (1977)	54,000	43,000 (1977)	90,100 (1977)	26.5	25.0	29.5
			[c]55,620								
	WEST										
14128910	Columbia River at Warrendale, Oreg. (streamflow station at The Dalles, Oreg.)	1978	123,800	76	94	28,900	14,200	35,600	20.5	19.0	21.5
		1976–77 (Extreme yr)	160,900	71 (1976)	100 (1977)	35,900	15,500 (1977)	52,500 (1976)	20.0	18.5	22.0
			[c]153,200								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF AUGUST 1978

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of July 1978	End of Aug. 1978	End of Aug. 1977	Average for end of Aug.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	63	47	71	48	226,300 (a)
QUEBEC					
Allard (P)	77	72	79	67	280,600 ac-ft
Gouin (P)	74	69	81	66	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	86	73	75	67	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	90	84	87	84	3,330 mcf
Lake Francis (FPR)	83	73	79	82	4,326 mcf
Lake Winnipesaukee (PR)	91	78	83	75	7,200 mcf
VERMONT					
Harriman (P)	79	71	72	70	5,060 mcf
Somerset (P)	74	71	71	76	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	82	77	75	78	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	81	67	66	71	34,270 mcf
Indian Lake (FMP)	96	97	100	72	4,500 mcf
New York City reservoir system (MW)	91	83	76	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	86	77	63	75	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	45	44	47	41	51,400 mcf
Pymatuning (FMR)	97	95	101	87	8,191 mcf
Raystown Lake (FR)	68	67	67	55	33,190 mcf
Lake Wallenpaupack (PR)	72	69	64	64	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	97	95	80	88	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	92	93	82	88	12,580 mcf
Narrows (Badin Lake) (P)	97	92	96	99	5,617 mcf
High Rock Lake (P)	92	79	60	74	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	87	83	78	71	70,300 mcf
Lakes Marion and Moultrie (P)	81	83	70	67	81,100 mcf
SOUTH CAROLINA–GEORGIA					
Clark Hill (FP)	71	68	62	66	75,360 mcf
GEORGIA					
Burton (PR)	93	92	89	86	104,000 ac-ft
Sinclair (MPR)	89	81	90	86	214,000 ac-ft
Lake Sidney Lanier (FMPR)	60	60	53	58	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	95	92	86	85	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	59	48	42	53	1,156,000 cfsd
Douglas Lake (FPR)	54	43	31	46	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	72	88	68	68	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	61	51	46	53	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	65	63	63	68	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	97	100	71	75	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	90	93	48	63	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	39	40	19	34	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	96	95	78	.....	22,640,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	100	96	59	77	127,600 ac-ft
Bell Fourche (I)	80	57	23	39	185,200 ac-ft
Lake Francis Case (FIP)	81	79	73	77	4,834,000 ac-ft
Lake Oahe (FIP)	97	94	75	.....	22,530,000 ac-ft
MIDCONTINENT REGION–Continued					
SOUTH DAKOTA–Continued					
Lake Sharpe (FIP)	103	99	103	99	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	91	93	96	96	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	64	59	63	67	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	93	85	89	79	2,378,000 ac-ft
Keystone (FPR)	93	82	109	90	661,000 ac-ft
Tenkiller Ferry (FPR)	102	96	95	90	628,200 ac-ft
Lake Altus (FIMR)	73	51	70	48	134,500 ac-ft
Lake O'The Cherokees (FPR)	94	85	85	83	1,492,000 ac-ft
OKLAHOMA–TEXAS					
Lake Texoma (FMPRW)	97	92	96	92	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	53	46	85	46	386,400 ac-ft
Canyon (FMR)	93	107	90	68	385,600 ac-ft
International Amistad (FIMPW)	81	103	101	72	3,497,000 ac-ft
International Falcon (FIMPW)	67	64	87	64	2,667,000 ac-ft
Livingston (IMW)	87	83	94	79	1,788,000 ac-ft
Possum Kingdom (IMPRW)	82	97	92	100	569,400 ac-ft
Red Bluff (PI)	10	10	9	23	307,000 ac-ft
Toledo Bend (P)	88	84	86	83	4,472,000 ac-ft
Twin Buttes (FIM)	64	64	82	24	177,800 ac-ft
Lake Kemp (IMW)	46	55	76	85	268,000 ac-ft
Lake Meredith (FMW)	37	35	39	41	821,300 ac-ft
Lake Travis (FIMPRW)	54	72	84	74	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	100	99	78	94	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	97	96	100	101	5,232,000 ac-ft
Lake Chelan (PR)	100	96	87	94	676,100 ac-ft
Lake Cushman	103	101	79	96	359,500 ac-ft
Lake Merwin (P)	106	100	107	102	246,000 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	85	66	18	56	1,235,000 ac-ft
Coeur d'Alene Lake (P)	99	94	90	73	238,500 ac-ft
Pend Oreille Lake (FP)	99	100	98	100	1,561,000 ac-ft
IDAHO–WYOMING					
Upper Snake River (8 reservoirs) (MP)	84	72	16	54	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	101	95	62	86	802,000 ac-ft
Buffalo Bill (IP)	103	94	52	89	421,300 ac-ft
Keyhole (F)	86	84	60	44	199,900 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	65	56	44	47	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	0	0	0	17	364,400 ac-ft
Taylor Park (IR)	76	73	50	77	106,200 ac-ft
Colorado–Big Thompson project (I)	59	49	29	63	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	74	71	65	.....	31,280,000 ac-ft
UTAH–IDAHO					
Bear Lake (IPR)	72	68	56	56	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	87	83	17	65	1,000,000 ac-ft
Hetch Hetchy (MP)	101	97	37	68	360,400 ac-ft
Isabella (FIR)	86	72	7	29	551,800 ac-ft
Pine Flat (FI)	89	67	7	38	1,014,000 ac-ft
Clair Engle Lake (Lewiston) (P)	81	79	14	77	2,438,000 ac-ft
Lake Almanor (P)	99	94	59	54	1,036,000 ac-ft
Lake Berryessa (FIMW)	76	72	49	79	1,600,000 ac-ft
Millerton Lake (FI)	95	79	38	41	503,200 ac-ft
Shasta Lake (FIPR)	91	81	13	70	4,377,000 ac-ft
CALIFORNIA–NEVADA					
Lake Tahoe (IPR)	35	23	6	63	744,600 ac-ft
NEVADA					
Rye Patch (I)	47	40	37	76	157,200 ac-ft
ARIZONA–NEVADA					
Lake Mead and Lake Mohave (FIMP)	79	79	75	71	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	13	10	0	12	1,073,000 ac-ft
Salt and Verde River system (IMPR)	81	76	26	37	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	30	27	34	79	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	10	6	6	23	2,539,000 ac-ft

[a] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

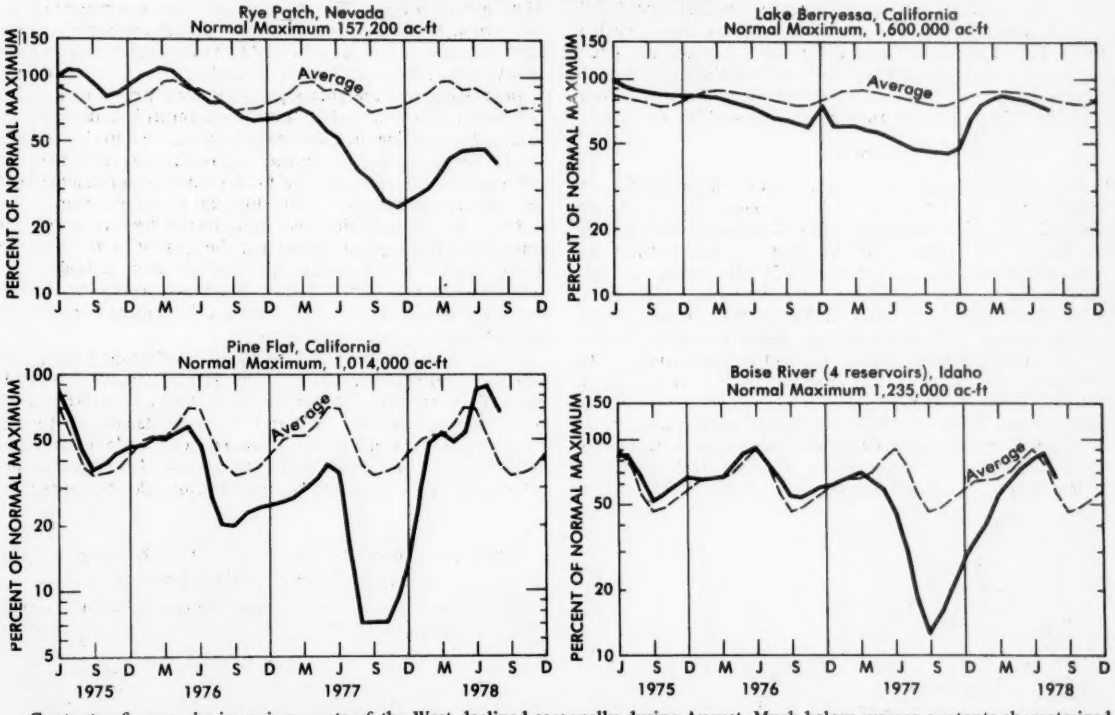
Provisional data; subject to revision

FLOW OF LARGE RIVERS DURING AUGUST 1978

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	August 1978					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine	5,690	9,397	1,574	45	-56	1,150	740	31
1–3185	Hudson River at Hadley, N.Y	1,664	2,791	740	68	+29	625	400	31
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,450	1,327	93	+2	480	310	28
1–4635	Delaware River at Trenton, N.J	6,780	11,360	6,344	149	+26	3,620	2,340	27
1–5705	Susquehanna River at Harrisburg, Pa	24,100	33,670	14,700	194	+15	6,800	4,400	31
1–6465	Potomac River near Washington, D.C	11,560	[1] 10,640	11,260	367	+25	3,640	2,350	31
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C	4,810	4,847	3,250	110	-2	1,090	700	31
2–1310	Pee Dee River at Peedee, S.C	8,830	9,098	7,630	125	+17	3,390	2,190	29
2–2260	Altamaha River at Doctortown, Ga	13,600	13,380	6,333	101	-55	5,230	3,380	30
2–3205	Suwannee River at Branford, Fla	7,740	6,775	5,410	100	+17	4,750	3,070	30
2–3580	Apalachicola River at Chattahoochee, Fla	17,200	21,690	20,300	142	+74	14,500	9,370	30
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	21,700	3,611	76	-17	2,100	1,360	31
2–4895	Pearl River near Bogalusa, La	6,630	8,533	2,714	98	-5	2,020	1,310	29
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 18,700	5,330	113	-20	3,060	2,000	23
3–0850	Monongahela River at Braddock, Pa	7,337	[1] 11,950	9,720	235	-40	3,750	2,420	23
3–1930	Kanawha River at Kanawha Falls, W.Va	8,367	12,370	7,260	173	+28	3,260	2,110	26
3–2345	Scioto River at Higby, Ohio	5,131	4,337	1,460	162	-15	904	580	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	110,600	64,840	217	+2	35,100	22,700	27
3–3775	Wabash River at Mount Carmel, Ill	28,600	26,310	18,410	216	-22	10,300	6,660	29
3–4690	French Broad River below Douglas Dam, Tenn	4,543	[1] 6,528	5,616	179	+103	.....	.....	.....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,142	2,307	106	-57	.....	.....	.....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	239,100	278,300	110	-4	278,000	180,000	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	24,900	5,490	34	-51	20,600	13,300	31
5–0825	Red River of the North at Grand Forks, N. Dak	30,100	2,439	1,340	111	-57	860	560	27
5–3300	Minnesota River near Jordan, Minn	16,200	3,306	2,160	118	-45	1,020	660	24
5–3310	Mississippi River at St. Paul, Minn	36,800	[1] 10,230	11,190	155	-49	11,300	7,300	23
5–3655	Chippewa River at Chippewa Falls, Wis	5,600	5,062	7,708	269	-3	18,500	12,000	29
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,457	7,974	162	-58	13,000	8,400	28
5–4465	Rock River near Joslin, Ill	9,520	5,288	4,990	180	-69	2,300	1,490	31
5–4745	Mississippi River at Keokuk, Iowa	119,000	61,210	59,230	155	-56	65,000	42,000	31
5–4855	Des Moines River below Raccoon River at Des Moines, Iowa	9,879	3,796	2,052	134	-72	2,730	1,760	31
6–2145	Yellowstone River at Billings, Mont	11,796	6,754	7,945	150	-68	5,000	3,200	31
6–9345	Missouri River at Hermann, Mo	528,200	78,480	79,850	144	-14	69,200	44,700	28
7–2890	Mississippi River at Vicksburg, Miss[4]	1,144,500	552,700	396,500	125	-18	302,000	195,000	31
7–3310	Washita River near Durwood, Okla	7,202	1,379	136	38	-65	110	70	31
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	732	298	100	-50	211	136	31
9–3150	Green River at Green River, Utah	40,600	6,369	3,063	100	-71	2,700	1,750	31
11–4255	Sacramento River at Verona, Calif	21,257	18,370	14,600	170	+14	14,800	9,570	28
13–2690	Snake River at Weiser, Idaho	69,200	17,670	10,000	93	-13	11,000	7,100	28
13–3170	Salmon River at White Bird, Idaho	13,550	11,060	7,437	137	-67	5,910	3,820	28
13–3425	Clearwater River at Spalding, Idaho	9,570	15,320	5,679	158	-73	7,810	5,050	28
14–1057	Columbia River at The Dalles, Oreg[5]	237,000	194,000	134,000	95	-53	.....	.....	.....
14–1910	Willamette River at Salem, Oreg	7,280	23,370	4,810	119	-14	8,650	5,590	27–31
15–5155	Tanana River at Nenana, Alaska	25,600	24,040	55,574	101	+15	48,500	31,300	31
8MF005	Fraser River at Hope, British Columbia	83,800	95,300	104,000	87	-34	76,500	49,400	31

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1975 TO AUGUST 1978



Contents of reservoirs in various parts of the West declined seasonally during August. Much below-average contents characterized Rye Patch Reservoir in Nevada. (See graph above.)

WATER RESOURCES REVIEW

August 1978

Based on reports from the Canadian and U.S. field offices; completed September 14, 1978

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for August based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for August 1978 is compared with flow for August in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for August is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the August flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of August. Water level in each key observation well is compared with average level for the end of August determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of July to the end of August.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

SUMMARY APPRAISALS OF THE NATION'S GROUND-WATER RESOURCES—GREAT LAKES REGION

The abstract and tables below are from the report, *Summary appraisals of the Nation's ground-water resources—Great Lakes Region*, by William G. Weist, Jr.: U.S. Geological Survey Professional Paper 813-J, 30 pages, 1978. This report may be purchased for $1.50 from Branch of Distribution, U.S. Geological Survey, 1200 S. Eads St., Arlington, VA 22202 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

The Great Lakes Region, as a whole, has abundant supplies of water. Nearly 805,000 billion cubic feet of water is contained in the Great Lakes. An additional 35,000 billion cubic feet of potable ground water is available from storage in the region (table 1). Estimated ground-water discharge to the streams and lakes of the region is 26 billion gallons per day.

Despite this abundance of water, the United States part of the Great Lakes basin is faced with many water-related problems, most of which involve water quality and water supply. Other problems concern periods of low flow in streams, preservation of wetlands, detrimental effects of erosion, and flooding. The significance of ground water in these problems is often overlooked.

Ground water can be an alternative to surface water as a source of supply or it can be used conjunctively with surface water to provide flexibility in water-supply management. Ground water supplied approximately 1,800 million gallons per day of the 39,900 million gallons per day used in the Great Lakes Region in 1970 (table 2). The ground-water contribution was only 4.5 percent of the water used. Thus, ground water represents a potential source of supply for much of the region. It also can be used, where conditions permit, to maintain lake levels and flow in streams, to dilute poor quality surface water, and to maintain or create wetlands and ponds.

In managing water resources, ground water and surface water should be considered parts of a single system. Management includes not only planning and controlling the development but also monitoring the effects of this development. Recent advances in ground-water hydrology have provided methods to resolve some of the development and management questions that formerly slowed the development of ground water.

All of the States in the Great Lakes Region have some regulations to control the development or protect the quality of the ground water. These regulations, however, are not as comprehensive as those governing surface water. Future legislation could be designed to encourage the development of ground water and, at the same time, to protect the resource.

Efficient development and management of ground-water resources requires a thorough knowledge of the system. Reports on ground water are available for about 80 percent of the Great Lakes Region. Most of these reports, however, are not sufficiently detailed to be useful in comprehensive planning. As ground-water development continues, quantitative ground-water studies, utilizing models as predictive tools, will enable this development to proceed in an efficient manner.

TABLE 2.—*Water use in the Great Lakes Region, 1970, in millions of gallons per day*

[Partial figures may not add to totals because of independent rounding]

Use	Total	Source [1]	
		Surface water	Ground water
Public supply	4,400	3,700	700
Self-supplied industrial	[2]35,000	34,300	340 fresh
			400 saline
Rural domestic	280	7	270
Livestock	90	24	62
Irrigation	90	53	37
	39,900	38,100	1,800

[1] Data from Murray and Reeves, 19"2.
[2] Includes thermoelectric power use.

TABLE 1.—*Water resources of the Great Lakes Region*

Lake basin	Average annual precipitation on basin,[1] 1900–69 (inches)	Average runoff into lake,[2] 1935–64 (ft^3/s)	Volume of water in lake[3] (billion ft^3)	Average outflow of lake through natural channel,[4] 1860–1970 (ft^3/s)	Estimated volume of ground water containing less than 3,000 mg/L dissolved solids available from storage [5] (billion ft^3)
Superior	29.56	50,300	431,400	75,000	3,500
Michigan	31.16	37,400	173,500	52,000	14,900
Huron	31.26	51,300	124,800	187,300	4,800
Erie	33.79	24,500	17,200	201,900	8,200
Ontario	34.18	28,100	57,800	239,200	3,600
Region	31.46	141,600	804,700	---	35,000

[1] Data from Leonard and Raoul, 1975, p. 36.
[2] Data from Leonard and Raoul, 1975, p. 37.
[3] Data from Leonard and Raoul, 1975, p. 7.
[4] Data from Leonard and Raoul, 1975, p. 13.
[5] Data from Norris and Fidler, unpub. rept., 1975.